HYDRATION OF CLINKER PHASES IN ALKALINE CONDITIONS

M. J. Sánchez-Herrero, Eduardo Torroja Institute (CSIC), Serrano Galvache 4, Spain
mjsanchez@ietcc.csic.es
A. Fernández-Jiménez, Eduardo Torroja Institute (CSIC), Serrano Galvache 4, Spain
A. Palomo, Eduardo Torroja Institute (CSIC), Serrano Galvache 4, Spain

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This research is focused on the individual behaviour of calcium silicates (C_3S and C_2S) and tricalcium aluminate (C_3A) when hydrated with water, but in the presence of 4 wt% Na_2SO_4. Two- and 28-day mechanical strength of pastes were determined and the reaction products were identified by means of XRD, SEM/EDX and ^{29}Si and ^{27}Al MAS NMR. Analysis of C_3A revealed that hydration was favoured in the presence of Na_2SO_4. This salt governed hydration kinetics while providing the alkalinity required to induce the joint precipitation of carbonated and calcium sulfoaluminate hydrate reaction product, both observed to contribute to the mechanical strength of the resulting material.

In both silicates (C_3S and C_2S), the findings showed that the presence of Na2SO4 stimulated mechanical strength development. The synergy among all chemical reactions taking place during the hydration of these calcium silicates favoured a substantial rise in the alkalinity of the pastes formed. In addition, the anion SO_4^{2-} induced the precipitation of cementitious gels with a high percentage of Q^2 units, which leads to a significant increase in the mechanical strength of the materials at 28 day.